

## TRIPOD

This invention relates to a tripod having a tripod top, at least one tripod leg consisting of at least three telescopically guided tubular segments for length adjustment, and a fixing device for fixing the adjusted length of the tripod leg.

5        Such tripods, whose tripod top can be formed for example for receiving optical devices, e.g. telescopes or cameras, are known. They usually have three tripod legs. To provide small transport dimensions, the legs are folded inwardly around the substantially horizontally extending axles on the tripod top and the segments of the tripod legs telescoped. To fix the adjusted length of  
10    the legs, an operating element is provided between every two adjacent segments in known tripods for actuating a clamping or similar device to fix adjacent segments together. In a three-legged tripod with three tripod leg segments in each case, this results in a number of altogether six operating elements which must each be operated individually for fixation for example  
15    when setting up the tripod. Moreover, the bottom operating elements can usually only be actuated in a bent-down posture.

The problem of the invention is to provide a tripod that has small transport dimensions while nevertheless permitting rapid and simple adjustment of the length of the individual tripod legs.

20        This is obtained according to the invention with the tripod characterized in claim 1. The subclaims render advantageous embodiments of the inventive tripod.

      According to the invention, the fixing device of each leg is actuated merely by rotating two segments relative to each other, preferably by rotating  
25    the middle segment relative to the first or top segment fastened to the tripod top. Thus, to set up a three-legged tripod one need only rotate altogether three segments to fix the segments of all three legs. Thus, the length adjustment of the legs can be performed fast and practically without bending down. According to the invention, the total fixing device of the tripod leg is thus

actuated by rotating one of the bottom segments relative to the segment fastened to the tripod top.

Preferably, a turning handle is provided on the bottom end of the first or top segment, i.e. the end facing away from the tripod top, for rotating the middle segment relative to the top segment. This additionally facilitates the setting up of the tripod.

The turning handle can for this purpose be mounted rotatably and axially undisplaceably on the top segment. It acts on the middle segment in axially displaceable and rotationally fast fashion, for example by a projection engaging a longitudinal groove of the middle segment.

The third segment is disposed rotationally fast relative to the middle segment, and each further segment relative to the adjacent segment facing the tripod top, for example by a projection engaging a longitudinal groove in the middle or further adjacent segment facing the tripod.

The segments of the tripod legs are preferably formed to be telescopic, each segment preferably being slidably guided in the adjacent segment facing the tripod top.

The formation of the segments as tubes, i.e. as closed profiles, guarantees high stability and moreover minimizes the risk of soiling.

The fixing device is preferably formed as a clamping device to permit infinite longitudinal adjustment.

To permit the formation of closed tubular segments, the clamping device preferably has a rod disposed coaxially in the tripod leg, said rod being guided rotationally fast in the first segment although the other segments can be rotated around it. Further, a slide that is axially displaceable and rotationally fast on the rod is provided to engage at least one clamping element with the inside of the first and middle segments and, in case of more than three segments per tripod leg, with the inside of the third and each further segment, upon rotation of the middle segment relative to the first segment in one

direction. Rotation of the middle segment relative to the first segment in the reverse direction disengages the clamping element.

The clamping element, which is preferably formed by a lever, preferably has a friction lining on the inside of the first and middle segments and, in case  
5 of more than three segments, the third or each further segment for frictional engagement.

The clamping lever acting on the inside of the first segment is fastened to the rod, preferably at the end of the rod facing the tripod. In contrast, the clamping lever acting on the inside of the middle segment and, in case of more  
10 than three segments, each further segment is fastened to the end of the third segment facing the tripod and, in case of more than three segments per tripod leg, to the end of each further segment facing the tripod top.

For acting on the slide, the clamping lever has on its inside facing the rod a surface extending obliquely to the longitudinal axis of the tripod leg. The  
15 slide, which is preferably formed as a sheath, is loaded against the oblique surface with a spring. To urge the slide with the spring against the wedge surface on the clamping lever, a ring shoulder with a surface facing the tripod top is provided on the end of the slide facing away from the tripod top. The middle and third segments and, in case of more than three segments per leg,  
20 each further segment have on the end facing the tripod top an abutment or opposite surface directed away from the tripod top that is loaded by the spring against the surface on the slide. The surface on the slide is formed as a cam oblique to the longitudinal axis of the tripod leg. Instead, the opposite surface or both the surface on the slide and the opposite surface can also form such a  
25 cam.

To release the clamping lever from the frictionally engaged position, it can be loaded by a return spring.

While the lever acting on the inside of the first segment is linked to the end of the rod facing the tripod top, the lever acting on the inside of the middle  
30 segment and, in case of more than three segments per leg, the inside of the

third and each further segment is linked to the end of the third or next segment facing the tripod.

For example, two or three clamping levers adapted to be spread apart act on the inside of the segments in each case.

5        In the following, an embodiment of the invention will be explained in more detail by way of example with reference to the drawings, in which:

Fig. 1 shows a side view of a tripod;

Fig. 2 shows a perspective view of a tripod leg;

10        Fig. 3 shows a longitudinal section through the tripod leg in the area of the device in which the second segment is clamped against the first segment;

Fig. 4 shows a section along line IV - IV in Fig. 3;

Fig. 5 shows a longitudinal section through the tripod leg in the area of the device in which the third segment is clamped against the second segment;

Fig. 6 shows a cross section along line VI - VI in Figure 5;

15        Fig. 7 shows a longitudinal section in the area of the turning handle on the first segment.

The tripod (1) has according to Figure 1 three legs (2) disposed on the tripod top (3) to swivel around substantially horizontally extending axles (4). Instead of being linked directly to the tripod top, the tripod legs (2) can also be  
20        linked to a middle column on which the tripod top is disposed.

The legs (2) are formed to be telescopic. For this purpose each leg (2) consists of three telescopically guided tubular segments (5, 6, 7), whereby the bottom inner segment (7), i.e. that facing away from the tripod top (3), is guided in the middle segment (6), and the latter in the top segment (5) linked to the  
25        axle (4) on the tripod top (3).

To fix the adjusted length of the telescopic tripod legs (2), i.e. the sliding position of the middle segment (6) and the bottom or third segment (7) of a leg (2), each tripod leg (2) has a fixing device that is actuated by rotation of the middle segment (6) relative to the first segment (5).

5        The fixing device is formed for this purpose as a clamping device having a rod (8) extending coaxially in the tripod leg (2) and guided rotationally fast on the first segment (5), according to Figures 3 to 6. For this purpose the rod (8) is provided on the end facing the tripod top (3) with a cross yoke (9) whose projection (11) engages a longitudinal groove (12) on the inside of the first  
10       tubular segment (5). In contrast, the middle segment (6) and the third segment (7) are disposed to rotate around the rod (8) (Figs. 5 and 6).

Two slides (13, 14) formed as sheaths or sleeves are guided slidably on the rod (8). The slide (13) is provided for clamping the middle segment (6) in the first segment (5), and the slide (14) for clamping the third segment (7) in  
15       the middle segment (6). The slides (13, 14) are disposed rotationally fast on the rod (8) by a projection (15, 16) engaging a longitudinal groove (17) in the rod (8).

The clamping device has two or more clamping levers (18, 19) and (20, 21) adapted to be spread apart for clamping the middle segment (6) in the first  
20       segment (5) and clamping the third segment (7) in the middle segment (6) in each case. While the clamping levers (18, 19) swivel on the cross yoke (9) around an axle (22, 23) extending transversely to the longitudinal axis (27) of the tripod leg, the clamping levers (20, 21) are linked on the end cap (24) at the end of the third segment (7) facing the tripod top (3) to swivel around  
25       transversely extending axles (25, 26).

The slides (13, 14) act on a surface (28a, 28b, 29a, 29b) extending obliquely to the longitudinal axis (27) of the tripod leg (2) on the side of the clamping levers (18, 19; 20, 21) facing the rod (8).

The slides (13, 14) are for this purpose loaded with a spring (31, 32) in  
30       the direction of the wedge surface (28a, 28b; 29a, 29b) which is supported at

its other end either directly on the end cap (33) on the middle segment (6) or on the end cap (24) on the third segment (7) via a cross yoke (34) to which the levers (20, 21) are linked.

5 For the slides (13, 14) to be displaced by rotation of the middle segment (6), each slide (13, 14) has at the end facing away from the tripod top (3) a ring shoulder (35, 36) whose surface facing the tripod top (3) is formed as an oblique cam surface (37, 38).

The cam surface (37, 38) is acted on by an opposite surface (39, 40) formed as an abutment and provided on the inside, i.e. the side facing away  
10 from the tripod top (3), of the end caps (33, 24).

When the middle tubular segment (6) is rotated, the abutment (39) is thereby moved from the position shown in Figure 3, in which it lies against the portion (37a) of the cam surface (37), to the portion (37b) of the cam surface (37) on the ring shoulder (35). This causes the slide (13) to be moved by the  
15 spring (31) in the direction of the arrow (42) against the wedge surfaces (28a, 28b) of the two clamping levers (18, 19), causing the levers to be spread apart and to lie with their outside surface against the inside of the first tubular segment (5) in frictional engagement.

While the middle tubular segment (6) is rotatable relative to the first  
20 segment (5), as apparent in particular from Figure 4, the middle segment (6) and the third segment (7) are interconnected in rotationally fast fashion. For this purpose the middle segment (6) has an inwardly protruding projection (43) engaging a longitudinal groove (44) in the third segment (7), according to Figures 5 and 6.

25 When the middle segment (6) is rotated, the third segment (7) is corotated, causing the abutment (40) to move from the portion (38a) of the cam surface (38) on the ring shoulder (36) to the portion (38b) of the cam surface and thus the slide (14) to be displaced by the spring (32) in the direction of the arrow (45).

Action of the slide (14) on the obliquely extending surfaces (29a, 29b) causes the clamping levers (20, 21) to be spread apart and thus the segment (7) to be clamped against the segment (6).

5 To increase the clamping force, the levers (18, 19 and 20, 21) are provided with friction linings (51, 52; 53, 54).

When the abutments (39, 40) lie against the portion (37b, 38b) of the cam surfaces (37, 38) in the clamping position and the clamping is to be released, they are turned back into the position shown in Figures 3 and 5. To support the release of the clamping levers (17, 18; 19, 20), return springs (55, 56) are  
10 provided that embrace the levers (17, 18; 19, 20).

To rotate the middle segment (6) and the third segment (7) coupled therewith relative to the first segment (5), a turning handle (46) can be provided according to Figure 7. The turning handle (46) is pivotally mounted on the first segment (5) with an axial bearing (47). It acts on the middle segment (6)  
15 rotationally fast, with the projection (48) engaging a longitudinal groove (49) in the middle segment (6). The turning handle (46) is disposed on the end of the first segment (5) facing away from the tripod top (3), as apparent in particular from Figure 2.